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BRIEF INQUIRY

INTO THE

NATURE AND PROPERTIES

OF

VACCINE LYMPH,

AND

ITS ACTION ON THE

HUMAN SYSTEM.

BY

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TO
THE RIGHT HONORABLE
LADY WILLIAM BENTINCK,

This Volume

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P R E F A C E.

IT is not my intention to detain the reader, by expatiating on the importance of the subject of which I have attempted to treat in the following pages, or on the variety and extent of its application in promoting the general happiness of mankind. However humble the primary source of vaccine lymph may be, its natural effects in Man were so simple and benign, as to arrest the attention even of the most unrefined and illiterate individuals of an age, which forms a distinguished epoch in the History of Medicine. At the earliest period of discovery it called forth, by its own intrinsic value, the calm inquiry of *Dr. Edward Jenner*, to whose memory we yield the most grateful

tribute of honour; and ever since it has furnished a theme of scientific pursuit. Previous to directing my steps to this clime, I had various opportunities of observing the state of vaccination not only in Britain, but also in several countries on the Continent of Europe; and I rejoice to add, from experience, that the happiest results appear to have invariably crowned this simple practice. It is now assiduously pursued by the most experienced of the Faculty, and introduced among all classes and ranks of society.

Ever since I arrived in this country, my attention has, in an especial manner, been roused to this subject, by witnessing the lamentable deaths which have occurred among the higher classes of Europeans, and the dreadful devastation effected among the Natives by the ravages of the Small pox. And I have been much grieved to learn, that prejudice and superstition are so deeply rooted in the

minds of many individuals, against the life-saving remedy provided by vaccination; as well as to find, that the knowledge of so simple and boonful an operation of nature as the action of the vaccine lymph, appears to be veiled under some mysterious cloud. From such observation, I have been induced to present to the community this little volume, with the view of furnishing a connected series of authentic facts regarding the origin and progress of vaccination. Actuated as I am with the desire of awakening many from a delusion, which they sooner or later may grievously lament, I am anxious, that all should draw their own conclusions from the facts adduced, that they may become alive to the true merits of vaccination, and voluntarily join in dismantling this department of Medicine, from its supposed garb of empiricism. (2)

The object which I have proposed to myself in all my medical researches has

been, to collect and present facts in a concise and accessible form, and to advance to well founded conclusions by following the steps of the most cautious induction. If in following out this course of investigation, I have sometimes had occasion to call in question doctrines generally received, I can only appeal to the principles which have now been stated. To opinions which have been received by others, I would never presume to oppose mere opinions of my own; but I cannot hesitate to submit both to the test of observations, which are calculated to ascertain whether they are founded on facts, and whether the facts are universal.

An apology is necessary to the Profession, for not imparting to them a detail of my experiments with vaccine lymph alluded to hereafter; but as they proved somewhat undecisive, I prefer for the present, deferring the statement of them.

Besides, it must be obvious to all, that any experimental pursuit in Science is accompanied with peculiar difficulties in this climate. I may simply state, that I have vaccinated a milch cow, with four punctures on the posterior aspect of the udder. After the third day, some redness and vesication were observable at those points, but in two days more these rapidly subsided, presenting the appearance of a blighted vaccine vesicle, similar to what is observed when man is re-vaccinated, after the lymph has once exerted its specific action upon his system. I could not, however, discover any marks which led me to suppose that the cow had been naturally affected with the *vaccina*.

The original matter which is interspersed through these pages, and the view which I have taken of the vaccine influence, in protecting the human system against the virulent contagion of Small pox, I trust will be appreciated by

the man of science, and discernible by the general reader.

If these humble efforts tend to the removal of error, and to the prudent and universal adoption of Vaccination, by establishing a conviction of its numerous advantages : and if I have contributed in some measure to the elucidation of Medical science, as well as to the improvement of this inestimable branch of Medical practice, I shall feel that I have not laboured altogether in vain.

Calcutta, 13th December, 1832.

BRIEF INQUIRY
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“ Paucorum morborum certa remedia hactenus humano generi tributa sunt. In numero eorum ad quos proprium remedium desideratur, variola quoque consenda est. Et si reperiatur aliquando medicamentum quod privatim valeat adversus hanc pestem posteriorum vel fortunae, vel ingenio, acceptum referendum erit.”—HEBERDEN.

I N Q U I R Y
RELATIVE TO
V A C C I N E L Y M P H, &c.

WONDERFUL as are the conquests of genius, and delightful as are the rewards that bestrew the fields of discovery and science, not less refined is the enjoyment experienced by the most Philosophic mind, when retracing these.

Few discoveries recorded in the annals of Medicine, have met with a more universal and immediate adoption among all nations, but have less engaged the minds of scientific inquirers, than that of the

Vaccine or true Cow-pock matter. So habituated are we now, to look upon its virtues as emanating from the human subject, that we have nearly lost sight of its humble source, mortifying as it may be to human pride, and medical vanity.

Towards the close of the last century,* it was first observed upon Cows, in the western dairy counties of England, as the matter of a pustular eruption incident to their teats. This was found to be impregnated with unspeakable benefits, when transferred to the human species : either by natural inoculation—when the Milkers have chopped hands ; or artificially—by inserting the virus, on the point of a lancet under the skin, which is now termed Vaccination. In one of the Annual Reports, made by the Faculty in France to the Government, there is the curious statement, that the

* Inquiry into the Causes and Effects of the Variolæ Vaccinæ, by *Dr. Jenner*, London, 1798.

matter employed, was obtained from Gloucestershire, being the only part of England where it had been found.

Any pustulous disease, to which cows are liable may be termed the Cow-pox : whether it arises from an over-distention of the udder, in consequence of a neglect in milking, or from the sting of an insect, or from any other cause. But the species to which we allude, as claiming our particular attention, is the "*Vaccina*," recommended to the world by *Dr. Jenner*, in the year 1798, as a substitute for the Small pox. The peculiar characters of the genuine Cow-pock, are so accurately given by *Drs. Jenner, Pearson, and Woodville*, as to distinguish it, *prima facie*, from any other false eruption on the cow. The *vaccina* appears in the nipples of cows, in the form of irregular vesicles of a blue colour, approaching to livid. The vesicles are elevated at the margin, and depressed at the centre.

They are surrounded by a broad and circular inflammation. The fluid they contain is limpid. The animals are indisposed, and the secretion of milk is lessened. If the cow be then neglected as to cleanliness or food, these vesicles often degenerate into phagedenic ulcers, which prove extremely troublesome when timely aid is not given.

On good authority, I may state, that there occurs in this country an eruption on the udder, well known to every husbandman and *gaowala*, which in every respect answers the above description, and is termed “*Musoory*” by the Natives. The *Musoory*, or Cow-pox of India, is confined to the teats and udder of milch cows alone, appearing in the form of small vesicles, from twenty to thirty in number, of the size of a *musoor** grain, and some a little larger. These vesicles contain a limpid fluid, are surrounded

* *Eryum hirsutum*.

by inflammation, and go through their course in ten to fifteen days. The scabs when formed, are small, and by the sucking of the calf, are not long retained but lost, leaving a few white scars behind on the udder. The cow is seemingly not much affected in health, and feeds as usual ; only she will not allow her calf to suck for a few days, but kicks at it. The vesicles are said by the Natives, to be spontaneous in their origin, without any extraneous infection ; and appear during any part of the year. They are communicable from one cow to the others, by the hand of the person who milks them, without, however, any inconvenience to himself.

I have not been fortunate enough as yet, to obtain a cow in that state for my own inspection, although I have been informed by the gentleman, who has communicated to me the above, that a cow belonging to a native goldsmith, about

thirty miles from Calcutta, was affected with the *musoory* in its most perfect form not long ago ; but the owner could not be prevailed upon by any reasonable inducement to part with his cow. I requested my friend to forward to me some scabs for vaccination, but for the aforesaid reasons, there were many difficulties in collecting them.

The fluid which is secreted during the progress of the vaccine vesicle in the Cow, as well as in Man, and termed LYMPH by *Dr. Willan*, is not the same as the coagulable lymph of *J. Hunter*. From the Chemical analysis of some French Physicians, it was found to consist of water and albumen. According to the latest analysis, it presents all the properties of a SERO-ALBUMINOUS fluid, holding the infectious animal secretion—the vaccine VIRUS—in solution ; “ and appears to be quite similar to that secreted in the first stage of suppuration.”

It is very remarkable, that the opinions of Medical men are divided, as to the origin of the vaccine phenomenon, and even now there is a veil, which intercepts our view of this simple, but boonful operation of nature. Some suppose it to be natural to milch cows, *sui generis*, and generated in them alone. *Dr. Jenner* and others consider it to be excited in their teats by infection, from the sanious discharge of "*Grease*,"—a disease attacking the heel or leg, or more commonly the fetlock-joint of the horse.

The cows may become affected by casual inoculation, produced either by their lying down in a meadow, where the affected horse had been previously feeding, and their udders coming in contact with the discharge, which had dripped on the grass and lodged there—or by the handling of their teats by milkers, who happened to have under their

care horses, labouring under that formerly most frequent complaint.

When *Dr. Jenner* directed his attention to the nature and effects of Cow-pox, he applied himself also to this subject, and left no means unexplored to insure the triumph of his discovery. He felt persuaded, that the two fluids of *vaccina* and *grease* were precisely the same, and capable of affording a like emancipation from the Small pox : as farriers and others, who had been inoculated with *grease*, were either partly or totally deprived of the susceptibility of that contagion. He was inclined to believe, that it was modified, and underwent some peculiar alteration in the Cow ; and when it excited the genuine pock, then *Dr. Jenner* concluded, that it was perfect. But whatever be the prophylactic power of *grease*, none can surpass or equal in respect to safety or simplicity, that,

reproduced upon the nipples—benign source from which vaccine lymph has been taken, from its earliest dawn.

It would be a fruitless exercise to mention the various opinions, which authors have offered upon this subject. An impartial summary of the facts, connected with the character and appearance of the vaccine vesicle, seems to confirm our belief in referring its origin in the cow, to the *Grease* of the horse.

According to the testimony of farmer *Benjamin Jesty*, *Dr. Pearson*, and others residing in dairy counties, “this affection is by no means a frequent or common occurrence among cows.” The long absence of it among the herds of all dairy counties in England, has fully corroborated such information. By the great advances made in Veterinary practice, that equine disease, to which the elements of the vaccine vesicle are ascribed, has been

nearly extinguished ; and this circumstance may account for the rarity of its appearance. As a natural affection incident to cows, *sui generis*, it would not have been confined to one spot of ground, but would have appeared in every dairy county of the known world ; whilst as yet, no where on the Continent has it been observed, of spontaneous origin. The animal does not droop until the third or fourth day after the appearance of the eruption, which is not the usual course in which disease manifests itself, as is well exemplified in Small pox. It is incapable of spreading in a state of *effluvia* ; nor can it be induced by any peculiarity of constitution, season, or diet, as cows are only once susceptible of it. Of all the Ruminantia, it is incident to MILCH cows only, and the seat of this affection is confined to their teats. The local nature of the *vaccina*, is a strong argument in favour of its having been produced by some virus ;

while its being peculiar to milch cows, may be accounted for by the communication of the virus to their teats, when handled by milkers.

Is there any thing, I would ask, so disgusting in *Dr. Jenner's* conclusions on this part of the subject, as to involve either his own reputation, or the fame of his dairy county, as *Dr. Parr** has expressed himself, when the fact can stand the test of the most delicate mind ? How readily might a servant, after dressing the diseased fetlock-joint of a horse, and not taking the necessary precaution for keeping his hands free from any virus, convey it to the nipples of the cow, by milking her afterwards ?—whence the origin of the *genuine* Cow-pox.

* “ Men servants seldom milk cows in this county, and when they do, such insufferable dirtiness as to milk with hands steaming with the running of a sore heel, would not be tolerated in any milking court in this county (Devonshire). Indeed, I think this publication a libel on his own neighbourhood.”—*London Medical Dictionary*.

The identity of *grease* with vaccine lymph, is so very remarkable as to strike at the root of all opposite doctrines ; capable as it is, of producing by inoculation on the human subject, all the phenomena of the latter, and possessing the same properties, only in an inferior degree. However self-evident these facts may appear, and in attestation of *Dr. Jenner's* views, yet I cannot help expressing my surprise, that no one should have followed up his researches, and long ere now have placed this subject in an indubitable light for himself, and all the undaunted advocates of Vaccination.

In France, many efforts have been made to produce and preserve this beneficent virus, which have been attended with the best success. The following account is given by citizen *Caque*, President of the Vaccine Institution at Rheims, to the " Committee of Health " at Paris, regarding the production of

the *vaccina* in the cow, by inserting the human vaccine lymph. “The Committee at Rheims, vaccinated a cow with vaccine lymph obtained from man. Three vesicles appeared on both teats, where three punctures had been made. With the lymph which was taken from that cow, nine individuals were vaccinated, in seven of whom the vaccine vesicle went through its usual course. With this new virus, ten more were vaccinated, in whom every characteristic appearance announced the perfect Cow-pox. This experiment proves—1st, that the nature of the vaccine virus is not altered in the human system, as the lymph taken from man imparts to cows the identical affection which has been found among English kine;—2d, that the vaccine lymph from the cow induces as little disease in man, as that taken from his fellow;—3d, it is evident that the properties of the virus, both from the cow and man, are *sui similes*, from the fact that it loses none of its specific

power by mutual transplantation, either from the cow in man, or from man in the brute."

Some years ago, these experiments were successfully repeated in Paris, and the result is as follows: "The Committee for the Vaccine Inoculation have had some cows vaccinated, and the issue was as we looked for. The vesicles developed themselves regularly, in the same manner as it has been observed in the vaccination of man. Advantage was taken of this opportunity, to vaccinate several persons with this lymph regenerated in the vaccinated cows, as well as to lay up a large quantity of it in store."*

I have observed, from a Medical Journal, that cows have been successfully vaccinated in Egypt, and I hope we shall soon hail the era in this country, when,

* Journal de Paris, No. 74 de la IX, Année de la Republique.

by this method, the vaccine lymph will be reproduced in the cow, in its original form. The experiments which I have instituted to this effect, have not been altogether satisfactory : therefore I would call upon my fellow Professional brethren in Bengal to lend their aid in the elucidation of this highly interesting subject.

The above experiments must lead us to view the vaccine lymph, as owing its origin to a foreign morbid secretion, * *sui generis* in its nature ; for if its virus were an original infectious principle, generated spontaneously in the system of milch cows, that excited in man by vaccination, when inserted into their teats, being homogeneous and natural to their bodies, would readily be amalgamated with the circulating mass of fluids, without possibly causing the re-secretion of the *identical* virus.

* Vide Medical and Physical Journal, Vol. IV, p. 381—466

At a period when the Small pox made such dreadful ravages among men, daily devouring its victims of all ages, without regard to their circumstances or rank in life, sweeping over immense tracks of country, and leaving its course desolate, by carrying numbers to an untimely grave, and stamping others with the most disgusting metamorphosis, or the most painful disease, the minds of all Professional men were in pursuit of some antidote, if not to eradicate this awful scourge, at least to enfeeble its contagious powers. Many ingenious plans and plausible speculations have been proposed, but none sufficiently effectual to check its progress.* The production of a mild form of the Small pox by Inoculation, a method still in use in some countries, has however, notwithstanding its frequent fatal effects, preserved the lives of many

* Vide *Hufeland's Journal of Practical Medicine*, Vol. X. No. 2, p. 192.

thousands, in spite of the severe struggles its general introduction had to encounter, against the firm holds of ignorance and prejudice.

Throughout Hindostan, this, in many respects, baneful practice of inoculation with the matter of Small pox is still adhered to most superstitiously,—more particularly by the natives of Bengal, among whom it is supposed to have originated. Satisfactory evidence leads me to corroborate the general opinion, that the dying embers of this wild-fire are kept alive, in a great measure, by the agency of the Tekadars,* who, by their annual visits to various districts, for their own selfish perquisites, seem to disturb and revive the few dormant atoms of this virulent contagion, which, as is alleged of the Cholera, are brooding, although not

* Tekadar, or Native Small pox Inoculator—a man of a low Brahmun caste, or Astrologer.

always epidemically, among the dregs of the Native population, where filth, wretched misery, and densely-crowded low habitations, all promote its development.

Mr. Cameron states, * “ that it is now well ascertained that Small pox inoculation is the great means by which variola is kept in existence; and that Calcutta, through its agency, is the great generating focus of variolous infection, from whence it spreads to every part of Bengal. While this practice continues, it will be utterly impossible to extinguish Small pox, or to prevent the occasional alarm even of those who have been vaccinated. It is therefore indispensable to the interests of humanity, that the practice should cease; but it is pretty evident, that while any pecuniary gain is deriv-

* Report on the present state of Vaccine Inoculation in Bengal, p. 11, Calcutta, 1831.

able from Small pox inoculation, individuals will be found to practice it ; and while any prejudices remain against Vaccination, which it is their obvious interest to keep up and increase, there will be no difficulty in finding subjects to practice upon."

That the blame, laid on the Tekadars, fifteen of whom, upon an average, continue in this Metropolis annually, from the month of February till May, is not unfounded and unjust, must be apparent, not only from their disseminating indirectly an infectious disease, but from the fact, that towards the time they generally take their departure from various districts, the Small pox acquires its acme of virulence by the concentration of the virus which they have thus induced ; and begins to prevail epidemically for some time, so as even to mark its ravages among the better classes of society in both sexes, and all ages in life.

To exhibit the light in which this practice of Inoculation is viewed by the Natives themselves in general, I cannot do better then quote a paragraph from a letter to the Superintendent General of Vaccination, from a well-informed native gentleman, *Rhadhakant Deb*. “ Those that have not had the Small pox by inoculation, or have never before been infected, as well as pregnant women, are removed from the house where inoculation is practised, because it is called in Sanscrit, ‘ Sunchare,’ or ‘ Sankramic roga,’ or a contagious disease.”* According to the testimony of Medical Officers in different parts of India the utter horror which the inhabitants of various districts have of the Small pox, is evinced by their forsaking instantly one of a family, who may have unfortunately attracted the infection, or by

* Vide Appendix, p. 74 Para. 5, of the Report on the present state of Vaccine Inoculation in Bengal, by *W. Cameron*, Presidency Surgeon, Calcutta, 1831.

driving him from their community ; often the sufferer is abandoned to his fate, or secluded and locked up in his house, where he sometimes perishes by more violent means than putting flames to his hovel of loathsome misery.

The exemption from Small pox, which some, who had never before had that disease, appeared to enjoy during their free intercourse with those suffering under its most malignant form, could not but immediately rouse the attention and inquiry of all around. It was soon discovered that this insusceptibility of their constitution was induced by their having once contracted pustules or sores on their fingers and hands, from cows, bearing the true affection in their teats. There is satisfactory evidence, that this fact was known from time immemorial, by farmers and others having the management of cattle in the principal dairy counties of England ; and it was also

customary to select dairy servants, or others who bore marks of having once had sores on their fingers or thumbs, as nurses to attend upon Small pox patients. *Humboldt*, in his work on New Spain, mentions some facts, which leave no doubt that the inhabitants of the Andes have long been impressed by the same phenomena as the dairy farmers of England. Relative to the antiquity of the information possessed on this subject, it appears from a work imputed to *Hauvantori*, written in the Sanscrit language, that at a very remote period the ancient Hindoos were not only aware of the preservative power of the vaccine lymph against the Small pox, but actually practised Vaccination.*

It was reserved, however, for modern times to elucidate and generalize the facts connected with this simple but beneficent

* Dict. des Sciences Méd. Article "*Vaccine*."

operation of nature. Though first observed by those uninitiated in the depths of learning, it was fully calculated to awaken the energies of the most scientific men of that age in which the discovery was made public; and the investigation of its details was accordingly pursued with great judgment and unabated ardour by *Dr. Jenner*, then resident at Berkeley, in Gloucestershire. He was soon joined by others, principally *Drs. Pearson* and *Woodville*, who, after a long continued course of the most accurate and cautiously repeated experiments, were fully convinced of the fact promulgated by farmers: viz. that the naturally mild Cow-pock lymph, when transferred to the human subject, is actually capable of annihilating the total susceptibility in man for the contagion of Small pox. A detail of their experiments is uncalled for, as their result is known to every one, and the rapidity with which Vaccination has passed over every quar-

ter of the world, from the Arctic circles to the extremes of Asia and Africa, and its adoption by civilized and uncivilized nations, by blacks as well as by whites, have fully established the value of this method, and its superiority over that of inoculation with the natural Small pox.

The vaccine lymph, handed down to the present age, was originally taken from the Cow in the year 1798, by the late *Dr. George Pearson*, founder of the original Vaccine Pock Institution* in London. In the infancy of Vaccination, this noble Institution was destined to become the fountain-head, whence issued so pure and abundant a supply of this fluid, as to diffuse its benefits over the whole world. By this medium, it was not only rapidly disseminated among the poorer classes of society, the Army and Navy being supplied by an order from

* First Report of the Vaccine Pock Institution, 1803.

Government, but it was gratuitously afforded to France, Germany, Russia, Portugal, Italy, different parts of Asia, Africa, America, and the West Indies, in all which countries Vaccination is now assiduously cultivated.

The difficulty of transmitting the vaccine lymph from England to Asia, and the repeated disappointments which were encountered in securing the success of that sent by sea, nearly put an end to every exertion to obtain a supply. But, by the zeal and abilities of some Medical gentlemen in the different Presidencies, and by the perseverance and anxious assistance, which this Government rendered for procuring it *overland*, the Cowpox was at last successfully excited, and established in Hindostan in the year 1802.

Dr. De Carro, in his letter to *Dr. Jenner* dated Vienna, February 14, 1801, giving

an account of the progress of Vaccine Inoculation in Germany and Italy, states, that among the various circumstances that led to the adoption of the Cow-pox inoculation in different parts of the Continent, none seem to him more interesting than those attending its introduction at Constantinople, under the auspices of *Lord Elgin*, the British Ambassador. His Lordship had heard such favourable accounts of the Cow-pox, that he introduced it into that city by the vaccination of his own child, *Lord Bruce*; discharging by this means, in some respect, the debt which England and all Europe had contracted with the Turks for the inoculation by the Small pox.

The British Indian Government represented to *Lord Elgin* the importance of its introduction into this country, and the benefits which would accrue to so large a portion of mankind, among whom the Small pox has been so dreadful a

scourge. *Dr. De Carro*, of Vienna, who has distinguished himself so honorably in this career, transmitted in the first instance, the vaccine lymph to *Lord Elgin*. By his Lordship's orders, the vaccine lymph, absorbed in cotton threads, and preserved in small glass bottles hermetically sealed, was sent to the Resident at Bagdad, and again to the Resident at Bussora. Great is the obligation which the public owes to both these gentlemen, for the interest they evinced in the subject. Fortunately, *Dr. Short*, a Surgeon of the Bombay establishment, residing at Bagdad, excited the vaccine vesicle at that place. He immediately forwarded the lymph to Bussora, where *Mr. Milne*, the Surgeon of that Residency, also succeeded in infecting a young patient with it. He soon afterwards vaccinated a number of other children, and sent the lymph by several ships to Bombay, where it arrived on the 14th June, 1802. The success even at

this place was not immediate ; and it was not till after thirty or forty trials by various methods and different Surgeons had been made, that a fortunate insertion of the lymph at length produced the vaccine vesicle in *Anna Dusthill*. This child, the daughter of a servant of Captain *Hardie*, was about three years of age. She was very healthy, and certainly never had the Small pox. It is necessary to mention these circumstances, as from her alone the whole of the vaccine lymph which has been disseminated all over India, was at first derived.

The vaccine lymph, which was sent through the benevolent attention of *Dr. James Anderson*, Physician General and first member of the Hospital Board upon the establishment of Fort St. George, to the Medical Board in Calcutta, was found at last to be successful, and was the means of introducing the practice of Vaccination into this Presidency. *Dr.*

Anderson succeeded in vaccinating two boys that were born of European parents at Botany Bay, where the Small pox had never yet appeared. At the time of the operation, these boys were employed on board the ship *Hunter*, then lying in Madras Roads; and by means of them Captain *Anderson*, the commander, hoped to be able to continue the Cow-pox in succession, until his arrival at Calcutta. The assiduous attention of the latter gentleman, to ensure success to the important commission with which he was entrusted, is highly meritorious. The lymph with which these two boys had been vaccinated, was taken from the arm of a healthy child at Chingleput, with threads sent on by *Mr. Rogers* from Trincomallee, where the vaccine vesicle appeared to all to be the genuine species.

The subsequent statement is given by *John Fleming, Esq.*, first member of the Medical Board of Calcutta, in his letter

dated November 29, 1802, addressed to *His Excellency the Marquis of Wellesley, K. P., Governor General in Council.* “ *Charles Norton*, the boy vaccinated by Captain *Anderson* on the 12th instant, arrived in Calcutta on the 17th, with such evident and decisive marks on his arm of being infected with the genuine Cow-pox, as left no room for doubt or hesitation. As the matter was already ripe for communicating the infection, three children born of European parents, belonging to His Majesty’s 10th Regiment, were vaccinated by *Mr. William Russell* on that day; and on the day following, the operation was performed on eight others. Among these were two children of *Mr. Barlow*, one of Colonel *Dyer*, one of *Mr. Birch*, one of *Mr. Trail*, and one of *Mr. Binny*, in all of whom, as well as in the three children of the 10th Regiment, I had an opportunity of observing the progress of the infection, and from comparing the symptoms and

appearance produced by it with the minute and circumstantial descriptions given by *Dr. Jenner*, *Mr. Atkin*, and *Dr. DeCarro*, and with the coloured plates with which their descriptions are illustrated, I am perfectly satisfied that it was the true vaccine disease. *Messrs. Russell, Hare, Shoolbred*, and other medical gentlemen, who had an opportunity of seeing the children, are fully impressed with the same conviction. In confirmation of this important fact, I think it proper to mention, that three children who were inoculated with the thread sent me by Captain *Anderson* from Kedgerée, as mentioned in his letter,* received the infection, and shewed in the progress of the disease the same characteristic symptoms and appearances on the arm as those that were inoculated from *Norton*. The same satisfactory result was experienced in respect to two children vaccinated by

* Vide Appendix A.

Mr. Shoolbred on the 20th, and two others on the 21st, from matter taken from *Norton's* arm on the 19th, all of whom, he assures me, exhibited, in the most unequivocal manner, the distinguishing symptoms of the genuine Cow-pox."

The above sketch of the steps by which the vaccine lymph was introduced into Bengal, may perhaps be deemed too prolix, and I may be thought more particular than what the subject required. But as we are anxious to be instrumental in dispersing it as widely as possible, and communicating its benefits to the most ignorant of mankind, and thereby, to a certain extent, promote the happiness of every family within the reach of our influence: I have wished to satisfy the public at large concerning the sources from which we, who are situated in this distant quarter of the world, have derived the vaccine lymph, and the foundation of our

belief that it is of the *genuine* kind. In confirmation of *Dr. Shoolbred's* opinion, I have the most perfect conviction, that the vaccine lymph used in Bengal possesses in full force, at the present day, the prophylactic quality which renders its discovery so inestimable a blessing to mankind. Those of my Professional brethren who are particularly curious upon this point, I must refer to the Appendix,* for an account of the character and progress of the vaccine vesicle in *Anna Dusthill*, who is perhaps the first human being who was successfully vaccinated in India.

Although the introduction of the vaccine lymph, and the subsequent establishment of Vaccination in India, took place under such flattering expectations, encouraged as these were by the most liberal efforts on the part of the local

* Vide Appendix B.

Government, it must excite no little surprise in the mind of the public to learn, that the only report in existence on the state of Vaccination in Bengal, during the period of more than a *quarter* of a century, is that of *Mr. J. Shoolbred*, which appeared in 1805, being three years posterior to the date of its first introduction into this country. *Mr. Cameron* appears to have been the next who, in this part of India, devoted a large share of his attention to the important subject. When he was appointed to the office of Superintendent General of the Vaccine Inoculation, at a time when the Small pox prevailed epidemically, to an alarming extent in the Western provinces, he spared no exertions to accumulate the necessary information as to the actual state of Vaccination, and its peculiar efficacy on the Native inhabitants. The result of his researches he gave to the public last year, in his *valuable* Report “on the Present State of Vaccine Inocu-

lation in Bengal." By his zealous efforts, he has raised this inestimable practice from that state of darkness and oblivion into which it had sunk for many years, and which must have formed a very material obstacle in the way of its dissemination among a people, who, blinded by ignorance and superstition, have scarcely as yet adopted this life-saving remedy, much less preferred it to the inoculation by the matter of Small pox.

The novel doctrine, that Vaccination would certainly, under all circumstances, and for any length of time, protect the individual in whom the true Cow-pox had been produced from all future liability to variolous disease, was so enthusiastically adopted by all, that it would have been deemed a very serious heresy to entertain a doubt upon the subject.

After the vivid excitement, however, created by this memorable revolution in

one of the most dreaded diseases incident to fallen nature,—a revolution so universally and so gratefully hailed by man,—had yielded to calm deliberation, the experience of successive years opened the eyes of the Medical world to its true merits. These are summed up, with great candour and judgment, in the following passage of a Report of the Vaccine Pock Institution already alluded to: “After every reasonable deduction, we are compelled to allow, that too many cases still remain, on undeniable proof, to leave any doubt that the pretensions of vaccination to the merit of a perfect and exclusive security in all cases against Small pox, were admitted at first rather too unreservedly. Yet the value of this important resource is not disparaged in our judgment; for, after all, these cases bear a very small proportion to the number of those who are effectually protected by it. We have undoubted proofs from experience, that where vaccination has been

performed perfectly, Small pox occurring after it, is almost universally a *safe* disease ; and though ushered in by severe symptoms, has hardly ever failed to be cut short, before it had reached that period at which it becomes dangerous to life.”* Even *Dr. Jenner* himself, before his death, had reason to be satisfied that Small pox may occur, after the most perfect vaccination.

It is very satisfactory indeed, in reviewing the history of the Small pox epidemics which have prevailed in many parts of Great Britain, since the introduction of Cow-pox, to find that of those persons attacked with Small pox, who had not been vaccinated, the proportion of deaths was, on an average, *one* in *four* : whilst of those who had undergone Vaccination, the proportion was not *one* in *four hundred and fifty* ! From the official

* Report of April 12, 1821.

statements of the Medical Staff made to the Medical Board, as to the efficacy of Vaccination among the natives of Bengal, it is exceedingly encouraging to learn, "that although variola prevailed extensively, and at some stations assumed the epidemic form, not one case is related of genuine Small pox succeeding to perfect vaccination. In many cases that had been previously vaccinated, a varioloid disease showed itself, went through its course mildly, and disappeared in a few days."

To me it appears, that we can only consider the vaccine lymph as a remedy bestowed upon us, to counteract this loathsome disease, or to palliate its violence; and that the vaccine influence, in preventing the Small pox, is *sui generis*, and merely relative. This, like all other infectious animal secretions, when inserted under the skin, exerts its antidotal action against the susceptibility of the

system for the contagion of Small pox ; and during its absorption, by a mysterious process, perhaps at the extremities of the *capillaries*, the prophylactic reaction is accomplished. The protective effects, whether permanent or transitory, manifested during the life of every vaccinated individual, are influenced by an active or passive state, or *diathesis* of the constitution, on which the intensity of the prophylactic agency depends, and proportionably to which the body is rendered inert against this dreadful infection.

The once fond hope of banishing this scourge from the face of the earth, by the substitution of the mild and harmless Cow-pox, more than fifty years' experience, and the still imperfect state of our knowledge, will scarcely allow us to indulge any longer, as no *specific* against any disease has hitherto been discovered. Moreover, if after an attack of the natural Small pox, a second, nay a third

similar attack may supervene, and sometimes carry off the sufferer, we cannot surely feel surprised at the existence of Small pox after the most perfect vaccination. Yet its discovery has proved so precious a blessing to mankind, and its effects are so beneficent, that we ought to thirst after a perfect knowledge of it, for the full enjoyment of that noble conviction, that whilst we are disseminating its influence both among the rich and the indigent, we are as much in the one case bidding the parental heart to cease to mourn, as in the other supplanting loathsome misery, by the substitution of a happiness to which thousands have hitherto been strangers.

Lest any of my observations might lead some to suppose, that I am not an advocate of Vaccination, or influence the minds of others in any degree, to slight its benefits—or lest, by any thing that experience has warranted me to say, the

enemies of this practice should presume to confirm their untenable views, a deliberate sketch of the DEVELOPEMENT AND PROGRESS OF THE COW-POX IN THE HUMAN SUBJECT will tend to obliterate, *in toto*, any such opinion.

We gather from the pages of those authors, who have observed the effects of vaccine lymph in its primitive state, that the natural form of Cow-pox in man, is concomitant with a very general irritation of the whole system. Vesicles more or less numerous appear about the joints or extremities of the fingers of milkers; their figure is circular, and there is a slight dip from the circumference to the centre. The lymph they contain is at first clear, but they soon suppurate and burst. The fever runs very high, sometimes bordering on delirium, and the axillary glands are much enlarged.

The original lymph from the vesicles on the teats, was at first employed for Vaccination, as well as that obtained from individuals, naturally infected from the same source. It appeared, however, that those vaccinated with the former, uniformly suffered more than those who had the re-produced lymph inserted; whilst the perfection which the vesicle obtained, and the protection to the system resulting from the action of the lymph, were equally effective in both cases. A statement of the rationale of the mitigating power, which, in this instance, the human body seemed to exert to an extraordinary degree on the original lymph from the teats, is highly requisite to the elucidation of the apparent anomaly. As the prophylactic power of the original vaccine lymph, under the different circumstances of reproduction, continues unaffected and the same, and as the degree of excitement experienced by the system in the one case is greater than in the other, this

difference must be independent of the peculiar antidotal action of the virus of the lymph. I would reasonably refer it to the stimulating action of its sero-albuminous fluid, possessing highly irritating properties, and proving foreign to the human system. The effect of each vaccination upon this fluid is a progressive interchange of its atoms with those of a sero-albuminous fluid found in man, carried on spontaneously, by the simple process of DILUTION, during its absorption and circulation through his system. By repeated descents from man to man, such a total dilution is effected, as scarcely to leave any traces of the natural solvent of the virus—the sero-albuminous fluid of the Cow. After a certain number of transmissions, it becomes entirely blended and transmuted into the sero-albuminous fluid of Man, which we may regard as constituting the mother-liquor of the vaccine virus used in the present generation. This, being natural to our system,

is readily assimilated, without causing any constitutional excitement whatever, not even so slight as to be indicated by the pulse of the vaccinated individual. The lymph from the teats, therefore, on its first insertion into man, being in a concentrated state, causes more unpleasant symptoms than the re-produced lymph, which, during its first transmission, is already sensibly affected by the diluent action. The lymph regenerated in the human system, has been afterwards preferred, and Man, for a long series of years, has been the sole repository of this vaccine secretion. Its insertion is now uniformly considered mild and safe, as even in infants there is scarcely any perceptible excitement of the system, whilst the vesicles go through their perfect course.

A successful vaccination is not altogether dependent upon the skill and dexterity with which it is accomplished,

but demands, on the part of the practitioner, a profound knowledge of the nature and qualities of the genuine vaccine lymph. By ignorance and want of experience on this point, spurious lymph has often been mistaken for the true; in consequence of which, in many districts both in Britain and on the Continent, a variety of *Vaccina*, denominated degenerate Cow-pox by *Sir Gilbert Blane*,* was unfortunately produced, which time and observation have scarcely eradicated. *Dr. John Thomson* remarks,† “I have not been able to discover, after the most minute attention, that any difference of effect whatever, in the modifying power of vaccination, has depended upon the skill of the operator, or upon his peculiar mode of performing the operation.” The figure of the vesicle, however, varies according to the manner in which the

* Evidence delivered before the Committee of the House of Commons, 1821.

† Historical Sketch, &c. p. 398.

lymph has been applied. If by a longitudinal incision, or scratch, as is commonly done, the shape of the vesicle is oval; if it has been by longitudinal and transverse ones of nearly equal size, or by simple puncture, then it is more or less regularly circular; and if the scratches have been made numerous and irregular in direction, or if the lymph has been applied irregularly, the shape of the vesicle is also irregular. The mode of vaccination adopted by Mr. *Jas. Hutchinson*, Secretary to the Medical Board of Calcutta, a statement of which he has communicated to the Medical and Physical Society, is ingenious and worthy the attention and adoption of the Medical world. The main object he has in view is, to insert the lymph by means of ivory points armed with it, into a puncture made in the usual manner with a lancet on the arm. The advantages of this method will be particularly felt when the vaccine scab is used, or where the lymph has been

transmitted in the form of armed ivory points. For a detail of his mode of operating, and the principle on which it rests, I would refer my reader to his highly interesting paper.*

The hypothesis as to the necessity of a plurality of punctures to prevent a failure in vaccination, has been banished by the numerous and cautious experiments upon the subject of inoculation for the Small pox by *Camper*.† These abundantly shew that a single effective puncture proves as secure, and produces as large a crop of pustules, as any number of punctures up to seven, which was the largest he thought worth while to try. Sufficient protection is afforded by one vesicle, if well preserved, or allowed to

* Vide Medical and Physical Society's Transactions, 3d December, 1831. Mode of Vaccination by *James Hutchinson, Esq.*, Secretary to the Medical Board of Calcutta.

† Dissertatio de Emolumentis, & Optimo Methodo Insitionis Variolarum, 1774. Vide *Thomson's History of Small pox*, p. 120, Ed. 1822.

remain entire ; and this is sanctioned by *Dr. Jenner's* powerful mandate.* Practitioners have now universally adopted the practice of making two punctures on each arm, below the insertion of the *deltoide* muscle, leaving the interval of an inch between them : hereby the unpleasant casualty of one or two being broken, or disturbed by accident or design, is effectually guarded against. The puncture should be made as superficially as possible ; for if much blood exudes, the lymph about to be inserted may become so diluted as to be rendered ineffective, or may be entirely washed away.

The *transparency* of the vaccine lymph, as the test alike of its genuineness, and of the proper period of using it, for the purpose of vaccination, is insisted upon by every author. “The golden rule of vaccination,” according to the late *Mr. Rush*,

* Continuation of Facts and Observations, p. 169, 1800.

is to employ the lymph from a well-formed vesicle, while in its most active state, not exceeding the eighth day. *Dr. Jenner* observes, that “the virus is most active and certain in its effects, when taken on the seventh, eighth, or ninth day.” The opinion held by *Dr. Pearson*, viz., that as long as the vesicle yielded a transparent lymph, it was capable of producing all the phenomena of the genuine Cow-pox, was once the rule of practice at the Vaccine Pock Institution. The careless observance of this rule, and the extent to which it was abused there, was observed by *Mr. John Marshall*, who has seen the lymph used after the vesicle had actually surmounted its height, even down to the *fourteenth day*!*

We can readily conceive, to what degree these different opinions of the

* Popular Summary of Vaccination, by *John Marshall, Esq.* London, 1829.

Fathers of Vaccination, must have influenced the views and practice of their zealous supporters. *A priori*, we would infer their results to be as discordant as their practice, and therefore are not a little surprised to find that they tend to the same grand result. From my numerous trials and uniform success, which more or less coincide with *Dr. Pearson's* views, I may confidently assert that, disregarding any particular ominous day, I have found the vaccine lymph from a genuine vesicle perfectly successful, when taken previous to the entire disappearance of its central depression, and as long as that contained in its elevated margins continues transparent. The limited day beyond which the lymph ought not to be used, I find to correspond with the period when it begins to get viscid ; and gradually is converted into a darker or brown coloured crust, which, when dry, falls off as a scab, leaving a peculiar cicatrix on the arm. When the inflamed vesicle has

advanced to this stage, the lancet cannot be properly armed with the inspissated lymph, and it is unfit to be inserted under the skin. Let every practitioner guard against vaccinating with lymph which presents itself opaque or puriform on the point of his lancet, as he exposes his patient to the risk of producing spurious Cow-pox, or a troublesome sore.

As the vaccine scab is found to be chemically constituted of exsiccated mature lymph, or lymph deprived of its aqueous particles, it is now easy to solve what once appeared a paradox:—how the vaccine scab, or a portion of it, when properly triturated and softened by exhaling on it, or with the least drop of cold distilled water, generates by vaccination the genuine Pock.* The scab remains effective for months, if carefully

* *Dr. George Gregory's Researches, Medical and Chirurgical Transactions, vol. 13.*

preserved, and was formerly employed and transmitted to distant countries for the purpose of vaccination. *Mr. Cameron* has informed me that he has seldom failed to restore a fresh supply of lymph to the Upper Provinces, where the Cow-pox itself had become extinct, or the lymph had lost its efficacy during the hot winds, by transmitting from the Presidency the mature dry scab. He has found it to retain its specific power for many months, under every variety of climate, and has successfully vaccinated with a portion of scab, even ten months after it had separated and fallen from the arm. *Dr. Henry*, of Manchester,* has ascertained experimentally, that vaccine lymph, though capable of communicating its infection after exposure to 120° *Fahrenheit*, is rendered inert by a temperature above 146° *Fahrenheit*; which I have found to

† *Philosophical Magazine and Annals*, November 1831, January 1832.

be also the case with the vaccine crust. I can only account for the frequent failures formerly, when the scab was employed, from its solution being usually effected by steam, or in water at a boiling temperature, whereby it was rendered inert,—the infectious principle being decomposed at so elevated a temperature.

The difficulty experienced during the hot months in the success of vaccination, is a circumstance taken notice of by all Surgeons in the Upper Province stations, but not accounted for by any. That the extreme temperature of the atmosphere should cause a change in the properties of the virus itself, we cannot admit, as it seldom or ever rises to 120° *Fahrenheit*, at which point the vaccine lymph is still found to be active. My Father remarked to me, that when he had, in the year 1805, the medical charge of the Hoogly stations, he invariably observed, that in those children who,

immediately after being vaccinated, had inadvertently been exposed to the direct rays of the sun, the vaccine vesicle never made its appearance, while with the very same lymph, the most perfect Cow-pox had been produced in others. He accounts for it by supposing that the minute atom of lymph after its insertion is dried up so suddenly as to prevent its absorption. I have repeated this, as an experiment, and have found such to be the result, by exposure equally to a summer or winter sun, providing there be sufficient heat to cause the immediate drying up of the minute globule of lymph which encrusts, as it were, the edges of the punctures, and thus excludes the possibility of its being taken up into the system. Any one who is acquainted with the peculiar nature of the *hot* winds, will readily perceive its action, without requiring any further comment on my part. That the non-appearance of the vesicle in this case did not proceed from an insusceptibility of

the constitution, was evident, as vaccination took effectually in the same child, when repeated under the necessary circumstances.

As the minute descriptions of the daily progress and appearances of the genuine Cow-pock, handed down by authors, are not satisfactory in a scientific and physiological light, we must examine the effect,—the inflammation of the *corion* or true skin,—which succeeds the application of vaccine lymph to the human body, before we can comprehend the natural changes which it undergoes. We shall find the vaccine vesicle to observe such a definite course on the arm of the European as well as of the Indian, as to be divisible into *two* distinct stages. The first may be denoted that of *primary* or *immediate* inflammation, in which the inflammatory process is confined with great accuracy to the cuticular surface of the corion, and results in effusion of lymph, or sero-albu-

minous fluid. The cellular disposition, characteristic of the fully-formed vaccine vesicle, terminates this stage. The next, or that of *secondary* inflammation, is indicated by the appearance of the *areola*, which usually takes place about the eighth day. This consists in the action being propagated to the substance of the corion, which is effected to some depth in the formation of puriform or purulent matter, and in destruction of part of its tissue. On the dark skin of some natives, the *areola*, however fully developed, is scarcely perceptible, and perhaps is best distinguished by the tension and delicate appearance of the skin surrounding the vesicle, to which the eye becomes soon habituated. In native children of a fair complexion, this difficulty is naturally not experienced.

CHARACTER OF THE VACCINE VESICLE IN
ITS PRIMARY OR IMMEDIATE INFLAM-
MATORY STAGE.

The point of skin on the arm, where the lymph has been deposited, becomes red and slightly raised about the second and third day, or from fifty to seventy hours after vaccination. This redness and elevation continue gradually to increase, till the cuticle becomes elevated about the fifth or sixth day into a flat pearl-coloured spot or vesicle, consequent on the secretion of a thin clear fluid, formed by the vessels of the corion on its cuticular aspect. From the first commencement of the vesicle its upper surface is uneven, the margin being more elevated than the centre, and shining, firm and distended, so as to project slightly beyond the plane of its base, or unaffected cuticle. It presents this appearance till the eighth or ninth day, when the surface is observed to be even, and in some

instances the centre may be higher than the margin. At this time, when the vesicle is supposed to be fully formed, its internal structure is found to be disposed into many minute communicating cells. They appear to consist of separate points of inflammation, at which the corial vessels discharge (as in other examples of the inflammatory process,) a sero-albuminous fluid, which is soon coagulated in a definite form. The coagulated portions form the partitions of the cells within which the fluid part is lodged. This I have found to occur under every variety of circumstance, when the origin of the vesicle is genuine, and its progress uninterrupted. Towards the close of this stage, some constitutional disorders may supervene, in the form of loss of appetite or sickness, slight thirst and heat, and dryness of the skin. The pulse is almost never affected.

CHARACTER OF THE VACCINE VESICLE IN
ITS SECONDARY INFLAMMATORY STAGE.

About this period, the transition into a deeper-seated inflammation is denoted by the skin round the vesicle becoming hard, tense and red, so as to form a ring or halo named *areola*, from one to two lines broad all round, and from a quarter to two inches in diameter, according to the size of the vesicle. The *areola* marks an augment or increase of inflammation in the substance of the corion, which continues with pain, tension and hardness, in some instances with obvious swelling of the contiguous parts, till the end of the tenth, or beginning of the eleventh day. At the same time, the lymph of the vesicle becomes opaque and thick, like purulent matter, rendering the centre yellowish, and depriving it of its pearly distended aspect. The well-defined *areola* is considered the pathognomonic proof of genuine

vaccine action, how slightly soever any other concomitant symptom may show itself. The vaccine vesicle, without an *areola*, takes place if the person have previously received the infection of Small pox, or if he be affected with some other contagious disease, during its progress.*

On the eleventh and twelfth days, as the marginal redness fades, the surface of the vesicle becomes brown in the centre, and less clear on the margin; the cuticle begins to separate; and the altered lymph becomes gradually converted into a hard round scab or crust of a reddish or yellow brown colour, which afterwards becomes black, dry, and shrivelled, and is loosened and drops off about the twentieth day after the time when the vaccine lymph was first applied. It leaves a permanent uniform CICATRIX or scar, according to the shape of the original vesicle, recognized by minute pits or depressions,

* *Dr. Willan's Treatise on Vaccination.*

corresponding to the number of cells of which the Pock consisted, and continues ever afterwards as the strongest presumptive proof of *successful* vaccination. Great care ought to be taken, to allow the black crust to remain until it separates spontaneously, for if scratched off prematurely, ulceration may be liable to ensue.

Even in the dark skin of the Natives of Bengal, the traits of genuine vaccination are sufficiently conspicuous to remove all doubts on the subject. The commencement of vesication on the fourth or fifth day—its gradual increase—circular form—depressed centre—cellular structure and limpid contents—the surrounding tumefaction, or *areola* where the skin is fair enough to shew it—the slight excitement on the eighth, ninth, or tenth day—and the subsequent progressive conversion of the vesicle into its peculiar horny, dark brown, glossy scab, which drops off

from the fourteenth to the twenty-sixth day, leaving a permanent pitted CICATRIX,—these, are circumstances belonging to no other affection, to which the human body is incident.

During the entire progress of the Cowpox, scarcely any medical treatment whatever is called for, as in the majority of cases there is no perceptible constitutional ailment; and all that can be necessary, should the accompanying indisposition be severe or troublesome, is a dose or two of some cooling aperient medicine. It is an erroneous popular notion, that unless vaccination be accompanied with high febrile symptoms and excitement of the system in general, it does not insure the patient from the liability to future contagion of Small pox. I am well aware, that this has often deterred Parents from vaccinating their offspring, even whilst the Small pox was raging around their abode,

supposing them too weak and tender to withstand the violent effects of this safeguard. The right comprehension of the simple interchange of the sero-albuminous fluid of the Cow into a similar fluid of Man, which we have endeavoured to show, proves that prevalent idea to be altogether untenable, if experience has not already taught us to reject it: as the vaccine virus stamps the system with the full possession of its *specific* power, independent of any excitement.

No preparatory steps are called for as in Small pox inoculation, for the performance of Vaccination. It may be safely imparted, regardless of seasons, all the year round, with equal efficacy, and at any time of life; but the best and securest period for the operation is the infant age, from six weeks to two or three months old, prior to the irritation of teething, when the child is in good health, and free from eruption.

Cow-pox is not infectious, since mothers whilst nursing their infants, under every disadvantage of poverty, and depraved food, have been vaccinated with the greatest impunity to their offspring. Nor has it ever been known to be communicable, from intercourse with places where a number of patients, having the vaccine Pock in its active state, were crowded together.

While the vaccine vesicle is in its progress, the individual is equally liable to an attack of any other indisposition: such as Chicken-pox, Measles, Hooping-cough, Scarlatina or teething; and in this event, the usual course of practice is to be pursued, for the removal of the disorder. The vaccine lymph has been supposed by many, to introduce along with it, the germ of other diseases derived from the constitution of the person, from whom it was obtained. Such an opinion however, is opposed by the most ample

experience, and by the general voice of the Faculty. The correct knowledge which we now possess, shows that its action is confined to the identical spots to which it is applied ; that these, and these only, become the seat of true vaccine inflammation ; and that whatever eruptions or other morbid changes in the skin succeed, or have been said to succeed, the communication of Cow-pock lymph to the human body, they are not the result of its genuine or proper action.

As the communication of the Cow-pox is so lenient, and its effects on the system hardly perceptible, the patient does not incur the slightest risk in undergoing Re-vaccination, if there should be any the least doubt as to its former perfect success.* The second application of the lymph in a person, who has previously

* *Dr. Jenner's Papers of Instructions for Vaccine Inoculation.—Medical and Physical Journal, May 1803, and August 1805.*

undergone vaccination, produces a smaller vesicle of the same character, but less intensely marked. This exhibits a remarkable property of Cow-pock inflammation, that it modifies considerably not only the variolous inflammation, but that produced by itself; on which *Mr. Bryce** has founded his ingenious test of the vaccine lymph having excited its proper action on the system. He suggests therefore, that vaccination be renewed, while the first is still in progress, and before the *areola* has appeared, when a vesicle is excited, which runs its course more rapidly than the original one, and terminates nearly at the same time with it. Although the *test-pock* is a proof, that vaccination has been effective, yet what degree of protection it affords, we can only with certainty know, by inoculating afterwards with variolous matter.

* *Practical Observations on the Inoculation of Cow-pox*, 2nd edition.

During the prevalence of every Small epidemic, the anti-variolous power of Cow-pox is strongly called into question, as deaths have so frequently occurred after vaccination. This has given birth to numerous prejudices in the mind of the vulgar; and even some Professional men have given way to the supposition, of a deterioration of vaccine lymph, by its being repeatedly re-produced and transferred from individual to individual; as well as to a belief in the transitory protection against Small pox, which vaccination affords.

As prejudices generally arise from ignorance, I would fain hope, that the extent of our experience will banish these from every enlightened mind.

As far as the eye can be trusted, as well as the testimony of those who saw the Cow-pox at the time of its introduction, vaccine lymph produces the same

sensible effects on the skin, and presents in other respects, the same properties at the present day, which it did in 1799 and 1800.—“ I know in point of fact,” says *Dr. Thomson*, “ that the vaccine virus which has been used at the Royal public Dispensary here, and in other parts of Scotland for a series of eighteen years, still continues to produce in those who are inoculated with it, the very same appearances which it produced on the first trials that were made with it, and that these appearances agree exactly with those, which have been delineated and described by *Dr. Jenner*, as characteristic of Cow-pock.* During the epidemic of 1816, 1817, and 1818, in various parts of Britain, and even in several countries of Europe, it was observed that the persons who had undergone vaccination at the time when the practice was first introduced, and who conse-

* Vide his work on the Varioloid Epidemic, &c. p. 315.

quently had been vaccinated with lymph which, according to the hypothesis of deterioration, must have been in its original purity and strength, were not less liable to Small pox, and suffered the disease with no less severity than those who had been vaccinated only a few months before, and at all intermediate periods. *Dr. Mason Good* * mentions a case that occurred to himself of a patient, about twenty years of age, who had been vaccinated, when an infant, by *Dr. Jenner*, in whom vaccination did not seem to exert any influence whatever upon the character of subsequent Small pox.

Relative to any deterioration in the vaccine lymph, which we would suppose this climate would highly favour, as it seems to alter our constitutions in so extraordinary a degree, I am happy to

* Study of Medicine, 3rd edition, 3rd vol. p. 58.

add the testimony of *Mr. Camreon*, whose experience and long residence in this country, and the particular attention he has paid to this important part of our profession, give the greatest weight to the assertion “that although the vaccine disease should have passed through so many thousand individuals since its introduction into Bengal in 1802, and it has never been renewed, its appearance and properties seem to have undergone no change. I have repeatedly,” adds he, “examined the vaccine vesicle, in all its stages, both in the Asiatic and European subject; and on comparing it with the best plates of *Dr. Jenner* and *Dr. Willan*, have reason to think, that it corresponds with these in every essential particular.”*

What further proof need we to subvert the hypothesis of deterioration in the lymph, and change in its properties, than

* Lib. cit. p. 16.

the decisive experiments related in an earlier part of these pages, by which the genuine vesicle has been successfully excited in the Cow, by inserting into her teats, the human vaccine lymph reproduced during successive transmissions for many years. If it could be shown, that the occurrence of Small pox, in the persons of the vaccinated was confined exclusively to those, who had been subjected to this process within the last few years, some doubts might be mingled with this point ; but by the detail to a conclusion of which we have nearly advanced, we are urged to distinguish truth from error with the eye of experience, which exhibits nature faithful in all her operations.

The regeneration of *vaccina*, in its usual form in the cow, by vaccination with human vaccine lymph, might serve as a test of its purity or uncombined state with any natural or morbid secretions derived from man. Thus a perio-

dical transmission, through the system of the Cow, might be resorted to, for purifying or reviving any of the properties of vaccine lymph, which may have become inactive or latent, during its transitions through multifarious constitutions; as gold in the hand of the refiner, by various transmissions through the furnace, parts with its alloys, and at length attains that state of purity denominated "virgin gold."

No facts warrant the conclusion, that the modifying or controlling influence of the vaccine virus, is at all altered in the system of man, by the interval of time from the date of vaccination. It never afforded perfect or absolute immunity from Small pox contagion, and at the present moment it furnishes as much security as it ever did. The sway it always possessed over Small pox epidemics, has only been relative. We all know, that although some may have resisted vari-

olous contagion, or even inoculation with that virus, it does not prove that they will always remain protected from that infection, in whatever state of concentration they may be exposed to it. We read of some,* who, after escaping epidemic diseases for a long time, have at length caught the infection and died: of some also, † who have died of a second attack of Small pox: of others, who have fallen a victim to Small pox after inoculation; and we see many, of all ages and of both sexes, who have been attacked with Small pox after vaccination. Nor can we ever feel convinced, that any CICATRIX, even if it be “small, cellulated, and radiated,” ‡ can sufficiently protect every one, and at all times, from variolous contagion.

* Vide *Mr. King's Cases* in the 15th, 17th and 18th volumes of the *Medical and Physical Journal*.

† Vide *Practical Observations on Cow-pox*, (Appendix No. IV.) by *Mr. Bryce*.

‡ Vide *Medico-Chirurgical Transactions*, vol. xii. part 2d, p. 335. London, 1823.

By referring to the light, in which I have ventured to view the action of vaccine lymph on the human system, the question, as to the permanency of vaccine security is at once decided, and commands that confidence, which has too repeatedly been shaken by credulity and ignorance alone. The temporary or permanent protection against Small pox, by imparting the mild Cow-pox must be entirely dependent upon the susceptibility of the system for the contagion of Small pox, and its prevailing *diathesis*, during the occurrence of the wonderful vaccine reaction. When these two opposite agents act one upon another, they must either be neutralized, or overbalanced one by another; and thus, *rebus paribus*, the prophylactic effects will be as various as the constitution and its idiosyncrasis are different. When the counteracting powers of the system on vaccine reaction are feeble, the more permanent will be the resulting protection, and *vice versa*.

No one who is sufficiently versed in the present History of Medicine, will deny that Vaccination effects a great and salutary alteration in the constitution of man; and it is to be hoped, that this precious boon, so graciously bestowed upon us, and so intimately connected with the temporal happiness of our race, will, in order to its own due appreciation, and for the advancement of science, more rarely be entrusted to the ignorant and imprudent.

Many years have elapsed since *Mr. Shoolbred* remarked, that the chief causes of the slow progress of vaccination among the Natives were owing “to their apathy against innovation—their indifference to improvement—and to the prejudices excited in their minds, by those engaged in the inoculation of Small pox:” and it must be allowed that these causes have scarcely been removed; notwithstanding the liberal offer, on the

part of Government, to lend effective aid in bestowing so great a blessing. And can we wonder at this, when we know how the blessing has been long disregarded by the lower classes of people in Europe, and what repeated and zealous appeals have been made, even from the Pulpit,* to the minds of the public, in order to impress them with the merits of that safeguard which they seemed to slight as unworthy of their adoption.

I am inclined to think, if the Tekadars were more encouraged, and some pains were taken to convince them of the value and simplicity of our practice, they would be prevailed upon to substitute the vaccine lymph for variolous matter. But how is this to be effected? By reasoning or persuasion alone? Who can effect this? They will not be convinced, even with thousands of the

* Vide Appendix C.

most glaring proofs before their eyes. Perhaps if they were rewarded, they might be persuaded: as money is the governing principle with them. The method adopted by *Mr. Cameron*, of filling up vacancies in the Vaccine department by appointing Tekadars, on an oath, of never practising inoculation for Small pox again, is highly to be recommended; and I would beg to draw the particular attention of Government to it.

If Government were at once to prevent the Tekadars from persisting in their pernicious practice, by imposing a certain penalty, and were to appoint those known to frequent this Metropolis annually to vaccinate with vaccine lymph alone, and, besides allowing the privilege of demanding their usual fee, award a certain sum for as many individuals as they could bring good proof of having successfully vaccinated, Small pox would in a short time become totally extinct. The

Tekadars are the very persons, who alone can bring round the Natives to the adoption of Vaccination; for the confidence they place in them, and in the absurdities and falsehoods they palm upon them, is quite unbounded.

In conclusion, I have compiled a comparative Table, contrasting the grand features of Vaccination with the lymph of Cow-pox, and those of Inoculation with the matter of Small pox, having facts and experience for their *sole* basis.

§ 1.

INOCULATION.

Inoculated Small pox is a contagious disease; every separate inoculation becomes the generating focus of that infection. By disseminating it, therefore, within large communities, the causes which excite Small pox are enhanced.

VACCINATION.

Cow-pox is not contagious; it cannot be communicated by any infection from those affected with it, nor by the contact of their clothes, or by intercourse with them. In this respect, there cannot be any anxiety in propagating Vaccination over the whole world.

§ 2

INOCULATION.

Inoculation cannot be performed without some risk on women *enceinte*, or on children during teething.

VACCINATION.

Vaccination is imparted without any danger, or apprehension, both to pregnant women and to children suffering from teething.

§ 3.

The danger existing in natural Small pox, is generally in proportion to the crop of pustules which appears. Inoculation often causes so large a number of pustules, as to excite alarm, and to leave the persons sadly disfigured.

After Vaccination there is rarely, if ever, a general eruption of vesicles ; the action is confined within the sphere of every puncture : so that, when two punctures are made, not more than two vesicles appear, and sometimes one only.

§ 4.

It is calculated, that of every thirty individuals inoculated, there is one who experiences the disease in its most malignant form, or is exposed to

Those who are vaccinated never suffer any illness ; if any febrile excitement should supervene, it is very trifling. I have never seen any

INOCULATION.

imminent danger by it.

VACCINATION.

one vaccinated obliged to keep his bed, or even so much as loose his appetite.

§ 5

Although the inoculated Small pox is incomparably milder than the natural, it is nevertheless true, that on an average, *five out of two hundred* fall a victim to this practice.

Cow-pox is seldom if ever fatal, and can never be considered so, as it is not accompanied by any symptoms of constitutional excitement.

§ 6

Inoculation is unfortunately often followed up by some severe affection, or leaves traces of deformity and disease behind.

According to the testimony of all authors, and my own observation, I cannot record a single instance of any disease having occurred consequent on Vaccination, nor of any the slightest affection being attributable to it.

§ 7

Inoculation cannot be safely performed, in all

Vaccination has been imparted with impunity

INOCULATION.

seasons of the year. Some are equally alarmed for an elevated, as well as a low temperature of the atmosphere.

VACCINATION.

and good success in the hottest weather; while the happiest effects have attended it within the Arctic circles.

§ 8

Persons advanced to a certain time of life, are fearful of undergoing Inoculation; and thus continue exposed to the contagion of Small pox, all their life time.

Those in the tender years of infancy, and others in old age, are subjected to Vaccination with perfect safety. I have myself vaccinated children at one month old, and have seen individuals vaccinated at the age of forty years.

§ 9

The practise of inoculating with the matter of Small pox is injurious, in perpetuating the infection of a dangerous, severe, and not unfrequently a fatal disease.

The substitution of Cow-pox, by diminishing the extent of the operation of the variolous infection, tends indirectly to diminish the disease generated by it, and the evils resulting from it.

APPENDIX A.

(COPY.)

JOHN FLEMING, Esq.

SIR,

Agreeably to your desire, I have the pleasure of sending you the following Memoranda respecting the persons I inoculated for the Cow-pox during my passage from Madras.

John Creswell, a boy born at Port Jackson, of European parents, aged about 13 years, was inoculated at *Doctor Anderson's* house at Madras, on the 10th of October, from a native child who had arrived that day from Chingleput. As the disease made its appearance rather late, and afterwards advanced very slowly, I did not take matter from him till the 22nd ultimo, when I inoculated M. A., an European child, aged 18 months. From her I inoculated *Harry*, a Malay boy, aged 7 years, on the 2nd November. And on the 12th, *Charles Norton*, a boy born at Port Jackson, of European parents, aged about 15 years, was inoculated from *Harry*. The disease having made its appearance in due time, as soon as the ship arrived at Diamond Harbour I sent him to town,

where he arrived on the 17th instant, and was disposed of as you directed.

The cotton threads which I sent you from Kedgerree, were strongly impregnated with vaccine matter taken from the European child and the Malay boy, on the 2nd and 12th instant, as particularly marked on each.

I have the honour to be,

Sir,

Your most obedient humble Servant,

(Signed) W^M. ANDERSON.

Calcutta, November 27, 1802.

APPENDIX B.

Extract of a letter from the Medical Board of the Bombay Presidency, giving an account of the introduction and success of the vaccine inoculation.

“ BOMBAY, JULY 2ND, 1802.”

“ From *Anna Dusthill*, on the eighth day of her disease, and on the 22nd of last month, seven children were inoculated, five of those who certainly never had the Small pox took the

infection, and have already gone through nearly the whole course of the vaccine disease. The other two were not infected, but there is some probability that one of them has had the Small pox. From the five children that were infected, about thirty more have been inoculated, and a great many of them no doubt will take the disease. From these last we shall send the vaccine matter to the other Presidencies, to Soorat, Poona, &c. &c. and care shall be taken, that none shall be employed, but from an unexceptionable source."

" The vaccine disease in *Anna Dusthill* passed, as we have said, through its ordinary course, as described by writers on the subject. The pustule began to show itself about the third day. During the course of the fifth and sixth, she had slight symptoms of fever, and some uneasiness in the arm-pit of the inoculated side. The pustule on the eighth day was of the proper size for that period. It was flat, rather concave, and it consisted of many cells, which on being pricked, gave out a transparent fluid. By the tenth day the inflamed *areola* round the pustule was extensive and very distinct, in spite of the blackness of her skin. She had only a single

pustule on the inoculated part, nor during the whole time did she suffer any material inconvenience from the complaint."

" All the five children who were inoculated from her, had a similar train of symptoms ; on two of them, whose parents were Europeans, the inflamed *areola*, from the whiteness of their skins, was much more distinct than it has been on *Anna Dusthill*."

" We have thus detailed the progress of the symptoms, and we have no doubt that this is the *genuine* Cow-pox. Some Surgeons here, who have seen the disease in Europe, are of the same opinion. We hope therefore, that this will tend to quiet the apprehensions of parents, which in some instances we find to be very great, and that our experience in this place, so far as it has gone, will give confidence to practitioners. Almost all the Medical men at this Presidency have witnessed the disease, many of them are inoculating for it, nor do we understand that any difference of opinion has arisen concerning its nature."

(Signed)

WILL. MOIR.

H. SCOTT."

APPENDIX C.

Extract of a letter from Dr. DeCarro to Dr. Jenner, dated Vienna, 14th February, 1801; giving an account of the progress of vaccine inoculation in Germany and Italy.

“ In the neighbourhood of Vienna, I had lately an interesting proof of the philanthropy of a clergyman, and of the good which that class of people can do. I had vaccinated four children of a gentleman living in the village Brunam Gebirg. The respectable curate of the parish made daily observations on the vaccination of these children, and was astonished at the slightness of the disease. He was particularly struck with the perfect likeness of the visicles to your beautiful copper plates. He wished to inform himself upon the subject of the vaccine inoculation, and was soon convinced so fully of the importance of the discovery, that the next Sunday he gave from the pulpit an history of the Cow-pox inoculation, and its immense advantages ; and concluded by a very parental and sensible exhortation to his parishioners to avail themselves of the benefit of it. He adopted this measure,

that he might ascertain the confidence they had in his directions, and their affection for their children.”

“ His harangue had such an happy effect, that the next Tuesday, the day fixed for my visit to the village, I found thirty-eight children waiting for vaccination ; and in three subsequent visits I have vaccinated more than eighty persons. The distance of that place from Vienna, not allowing me to go there so often as I wished, the physician of the place, *Dr. Iberer*, continues the vaccine inoculation, which has so much charmed all those country people, that they come now without further exhortations, either of the curate or of the physician. If that example, to which I have given as much publicity as I could, should be followed by the brethren of the worthy curate of Brun, how many thousand lives, so precious to the country after a destructive war, would be preserved ! ”

“ The Geneva physicians are so perfectly convinced of the advantages of Vaccination, that they have printed a short and popular exhortation to the people, which has been put into the hands

of all the clergymen, who are ordered to deliver a copy of it to the father and godfather of every child that is brought to church to be christened."

F I P I S.

